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THE NEWS MAGAZINE OF ELECTRIC UTILITY MANAGEMENT AND TECHNOLOGY

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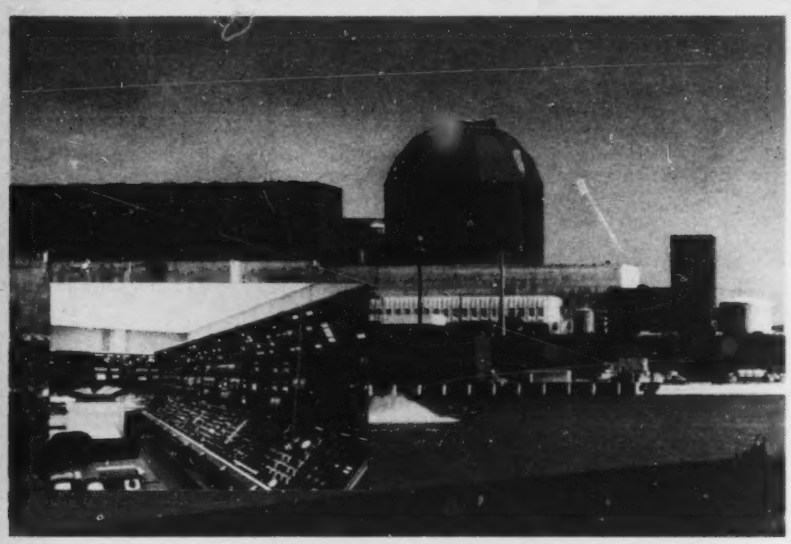

Illinois Power Co.'s 950-MW Clinton plant comes on-line after 12 years of construction. A multi-sided vapor barrier covers the conventional containment vessel to provide added protection to the environment. At left, the plant is equipped with a complete control-room simulator for operator training. The red telephone in the foreground would provide a direct line to the Nuclear Regulatory Commission. An open operating manual can be seen in the background.

Illinois Power's Clinton nuclear power plant finally goes on-line

DECATUR, IL—After 12 years of construction, Illinois Power Co.'s Clinton nuclear power station was expected to operate at full power by *EL&P* press time.

Construction for the 950-MW plant began in 1976 at a projected cost of $429 million. Final cost for the redesigned plant is estimated at $4.25 billion, an IP spokesman said.

Final testing included the "warranty run" test of the power plant's nuclear steam supply system, 100 hours of operation at 100-percent power, which was completed in October. Other tests related to automatic plant shutdown were then performed. After that, 37 days were needed to conduct "surveillances," required periodic tests to demonstrate that systems would operate as designed.

Al Adams, an IP spokesman, said the utility expects full-capacity operation from its first nuclear plant. Coal plants have provided over 98 percent of IP's generation in the past. Clinton, at full power, would provide about 17 percent of the company's requirements, he said.

IPCo anticipates filing for a rate increase related to Clinton by early 1988, Adams suggested.

About $1.5 billion of the plant's cost already has been incorporated into rates, he added. However, two audits for the Illinois Commerce Commission recommended that the company not be allowed to recover between $294 million and $463 million in costs the studies called imprudent. Three firms hired by IP for audits found no imprudence. Those reports are to be presented to the ICC for consideration and a final ruling, Adams said.

IP has about 540,000 electric customers in regions in central and southern Illinois.

Utilities give investors security during stock market's wild ride

Mark T. Hoske
Assistant Editor

During times of Wall Street crisis, investors flock to utility stocks for steady strength, safe principals and generally high yields, analysts agree.

Mark D. Luftig, with the New York-based Salomon Brothers Inc., said many investors sold industrial stocks during October's panic market and moved toward utilities because of their high quality and secure, regulatory environment.

For October, the Standard & Poors listing of electric companies outperformed all other groups with only a 3.5-percent loss in value. The Dow Jones Industrials were down 21.8 percent for October.

Luftig called the move a "big shift toward quality."

"I think people are going to stay with utilities. Between now and early next year it looks like an attractive place to be," Luftig projected.

Down slightly among big losses

Edward Tirello, from Shearson Lehman Brothers Inc. in New York, said while the rest of the market plunged, utility stocks were down just 2 percent from Sept. 30 through the first week in November.

"There's a flight to quality now and the highest quality stock is utility stock." Utilities are attractive, he explained, because they protect investors' principal and generally provide

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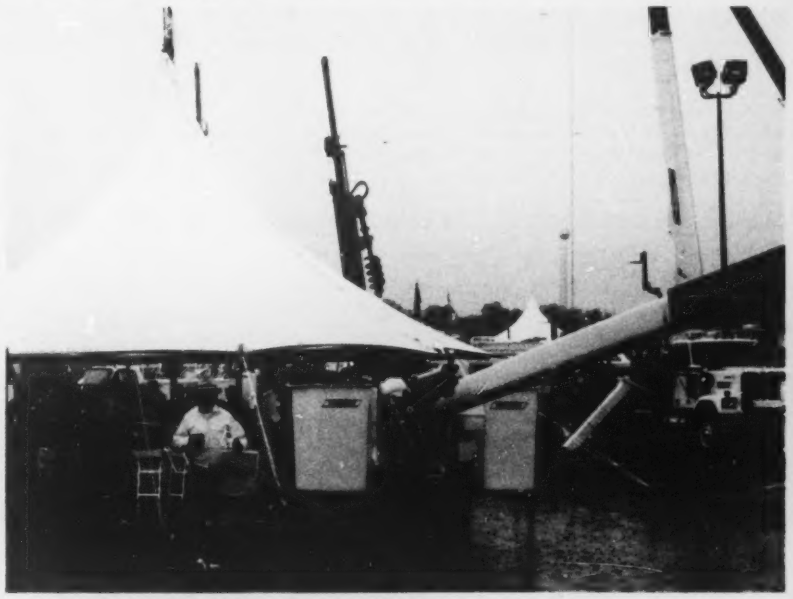
'The rain in Spain'...and at ICUEE '87 too



The first day of the 1987 International Construction and Utility Equipment Exposition (ICUEE) was wet enough to attract ducks and frogs, but the weather improved thereafter and attendees had two great days to enjoy the world's largest hands-on working trade show. Held for the first time at the Kentucky Fair and Exposition Center in Louisville, ICUEE drew more exhibitors and more attendees than ever before. A photo review appears on pages 8-9.

PSNH gains on Seabrook woes

MANCHESTER, NH—Public Service of New Hampshire has received some encouraging news about its troubled Seabrook nuclear plant, as reported in November's *EL&P*, and about the plant's impact on its finances. The NRC has ruled that utility-prepared emergency evacuation plans are sufficient for giving its approval for operation if local and/or state officials refuse to submit one of their own. A decision about Seabrook startup is expected before year-end.

PSNH, a 35.6-percent owner of Seabrook, has about $2 billion, nearly 70 percent of its assets, invested in the still-idle plant. The company filed reorganization plans to avoid forced bankruptcy proceedings for not making interest and principal payments on $800 million in debt.

A number of evolving issues may decide the fate of PSNH and Sea-

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Savannah Elec. merges into Southern Co.

SAVANNAH, GA—Savannah Electric & Power Co. will be merged into the Southern Company, according to an announcement by the Boards of Directors of the two utilities.

The merger is subject to approval by Savannah Electric shareholders and the Securities & Exchange Commission.

Savannah Electric will continue to be headquartered in Savannah and its current management will retain operating responsibility. The company will have the same relationship to the Southern Company as other independent operating subsidiaries, such as Alabama Power, Georgia Power, Gulf Power and Mississippi Power.

While Savannah's common stock will be exchanged for Southern Company common, its existing debt securities, and its preferred and preference stock, will remain outstanding.

Mutual benefits

In a joint statement, Southern Company president Edward L. Addison and Savannah Electric president Arthur M. Gignilliat, Jr. said the merger is a logical and natural business combination. Participation in the Southern electric system power pool will allow Savannah to cancel plans for needed capacity in the late 1980s. The Southern Company gains by addition of Savannah's economically strong service territory and access to the state's major deep-water port.

News Briefs

JILL MINNER, Assistant Editor

Stone & Webster Engineering Corp. forms new subsidiary

● A new subisidiary, Stone & Webster Environmental Services, Inc., has been established by Stone & Webster Engineering Corporation. The company said its new unit, headquartered in Boston, will provide multidisciplinary environmental services to federal, state and municipal agencies, electric utilities and industrial companies.

Sherco 3 generating plant begins commercial operation

● The 800-MW Sherco 3 generating plant began commercial operation recently, according to its owners Northern States Power Co. (NSP) and Southern Minnesota Municipal Power Agency. NSP said its $1-billion, coal-fired unit started ahead of schedule and below the original budget. "This achievement is the result of an extraordinary cooperative effort among highly-skilled craft workers, contractors and managers," stated Roland J. Jensen, NSP vice president-engineering and construction. According to NSP, which acted as construction manager and overall project manager, Sherco 3 is Minnesota's largest construction project ever.

Westinghouse Hanford expert given French scientific medal

● Westinghouse Hanford Company's James J. Laidler has been awarded the 1987 Charles Eichner medal of the French Metallurgical Society. Laidler was honored for his achievements in developing improved alloys for nuclear applications, according to Westinghouse. Sponsored by the French Atomic Energy Commission, the award is given to an expert in metallurgy who has made exceptional contributions in the field of nuclear power. The company said that this is the first time the award has been given for a Hanford-related activity.

NRECA/EPRI video shows value of research and development

● The National Rural Electric Cooperatives Association (NRECA) and the Electric Power Research Institute (EPRI) said they have produced a videotape which protrays the value of research and development to rural electric cooperatives, to the general utility industry and to the American culture. *The R&D Harvest* includes interviews with Sen. John Glenn, Buckeye Power Co. President Bob Cleveland, Jackson County Rural Electric General Manager Don Clodfelter, and Richard Balzhiser, executive vice president of R&D for EPRI. The film highlights rural electrification's historical roots; rural electric case studies of EPRI/NRECA R&D product use; the importance of R&D in putting John Glenn into space; superconductivity as an example of technology to maintain America's R&D preeminence; the consumer cost of R&D and more. For further information contact Ellie Hollander at EPRI (202) 293-7513, or Lowell Endahl at NRECA (202) 857-9598.

CLECO appoints Terbot chairman, names Brame president

● Central Louisiana Electric Company, Inc. selected William F. Terbot as chairman and chief executive officer and appointed Scott O. Brame as president, chief operating officer and a member of the board. Terbot has been president and CEO of the company since 1985, and Brame served as senior vice president of finance and rates since 1974.

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EL&P readers whose responsibilities include both Generation and Transmission/Distribution receive both technology sections. Other readers receive the technology section that applies to their respective area of responsibility. The Generation edition is indicated by a single dot (•) in the upper right corner of page 1; the T/D edition carries two dots (=). All readers receive EL&P's industry news section.

Public Service Indiana Board approves holding company plan

● A plan to form a holding company for Public Service Indiana (PSI) has been approved by the PSI Board of Directors. "Our board of directors and the management of the company believe the reorganization will provide a more flexible structure and a greater opportunity to grow in today's changing business climate," explained PSI Chairman and CEO Hugh A. Barker. If the plan is approved by the company's shareholders at the annual meeting in April, all shares of PSI common stock will be exchanged for shares of holding company common stock—existing preferred stock of PSI would remain as a security of PSI.

Top management transition planned at Minnesota Power

● Minnesota Power chairman and CEO Jack F. Rowe has announced plans to retire in May 1989 after 39 years of service. Rowe said he will step down as CEO in May 1988 and as chairman in May 1989. Arend J. Sandbulte, the utility's president and chief operating officer, has been named to succeed Rowe as chief executive officer. Sandbulte was chief financial officer from 1976 to 1984, served as president since 1984, and has been deeply involved with Rowe in strategic planning efforts, according to Minnesota Power. The company has prospered under Rowe's leadership and in 1986 was named 'Electric Utility of the Year' by *Electric Light & Power*.

BBC Brown Boveri's plans may boost future group's position

● BBC Brown Boveri, Ltd. recently signed a letter of intent with GE USA to purchase its shares of Sadelmi S.P.A., according to Brown Boveri. If the letter is approved by both companies' board of directors, Sadelmi will then become part of the forthcoming ASEA Brown Boveri Group's Power Lines Division. In addition, Brown Boveri announced that it had signed a preliminary contract with Italmobilaire S.P.A. to share financial and technological interests in the electromechanical market. The company said the move will strengthen ASEA Brown Boveri Group's position in Italy's power generation, industrial equipment and automation markets, and that the Sadelmi purchase will help the Power Lines Division become a worldwide industry leader.

SDG&E subsidiary buys pollution control equipment supplier

● San Diego Gas & Electric Company said its wholly owned subsidiary, Pacific Diversified Capital (PDC) has acquired Wahlco, Inc., a supplier of air pollution control equipment to the electric utility industry. Wahlco manufactures and distributes flue gas conditioning systems and is the fourth purchase PDC has made in the last twelve months, according to the utility.

SEI to evaluate the effectiveness of industry drug programs

● Southern Electric International, Inc. (SEI), a subsidiary of The Southern Company, has signed a contract with the National Institute on Drug Abuse to study the effectiveness of drug programs conducted by business and industry. SEI said the two-year study will compare employee productivity, absenteeism and morale before and after the initiation of drug testing programs. "We're optimistic that the results of this study will lead to a more complete understanding of drug issues in the work place," stated Charles Parker, manager for facilities and resource services at SEI. "That knowledge should prove beneficial to all American industry," he added. SEI was established in 1982 to market the technical and managerial expertise of Southern's electric system.

NU receives six awards for its energy conservation programs

● The State of Connecticut Energy Division has presented Northeast Utilities (NU) with six Energy Innovation Awards for the utility's work in promoting conservation. NU said its award-winning projects include: a campaign to market energy-efficient lighting; a guidebook for architects on energy-efficient design; comprehensive conservation projects at two high schools; a weatherization revolving loan fund to help low- and moderate-income customers finance conservation measures; and a partnership with Connecticut Light & Power Company's nonprofit human service agency customers to show how grants can make energy conservation affordable.

Virginia Power, foundations to sponsor scholarship program

● In cooperation with Virginia Power, the Thomas Alva Edison Foundation and the Max McGraw Foundation have announced plans to sponsor the Eighth Annual International Thomas Edison/Max McGraw Scholarship Program. The purpose of the program, which is open to all high school students, is to encourage and recognize outstanding students interested in pursuing science or engineering careers or otherwise demonstrate the creativity and perseverance of Edison and McGraw. Twelve scholars will be named as well as two grand award scholars, according to the foundations. Virginia Power said it will give a separate $1,500 local award to a student from its service area.

Electric Utility Market Research Council celebrates 25 years

● The Electric Utility Market Research Council, an affiliate of the American Marketing Association, marked its 25th anniversary at its fall meeting in Houston, TX. Council members from 28 investor-owned utilities attended the meeting, which was hosted by Houston Lighting & Power Company. "We hope to continue sharing information among different utility systems as well as expand our visibility and assistance in the use of state of the art market research techniques within the industry," stated David Mercurio, council president and manager of market analysis at Public Service Indiana.

Utilities spend $564M on 1986 RD&D, cites report

DENVER—One-hundred-twenty, investor-owned utilities spent $563.7 million on research, development and demonstration in 1986, representing 0.45 percent of their electric revenue, according to *The TECC Guide to U.S. Electric Utility RD&D Funding 1986-1987*.

The report says 120 utilities spent more than $100,000 during 1986 on RD&D. The average was $4,697,280 each. That amounts to 2.33 percent of net electric operating income, $7.57 per electric customer, $1,184 per electric department employee or $0.29 per MWh sales. (See table for listing of top 20 in two categories.)

TECC Group Inc., a consulting firm for research and technology management, compiled the report from individual 1986 FERC Form No. 1 reports, utility annual reports and correspondence with utilities, explained James R. Schetter, TECC president.

Schetter said this was the first year TECC compiled the guide. When compared to other industries, utilities seemed to spend less on RD&D, perhaps because of the regulated environment, he suggested, though parallel figures were unavailable.

Comparison tricky

Comparing utilities is tricky, Schetter warned, because each state has its own regulatory environment. In New York, for example, law prohibits utilities from spending more than 1 percent of revenue on RD&D, he said. Also, utilities unfamiliar with a technology may spend more, as when a utility constructs its first nuclear plant.

Ratios are sometimes skewed due to accounting manuevers, such as deferred funding, he added. Such differences are pointed out in the report, said Schetter.

If the industry sees more deregulation, utilities will put a greater emphasis on RD&D, because of greater competition, he suggested.

The 130-page guide names 120 utilities, RD&D contact persons, 1986 RD&D funding in 12 major catagories and five comparitive RD&D funding ratios.

The TECC Guide to U.S. Electric Utility RD&D Funding 1986-1987 is $149 and available by calling (303) 973-1777.

California may change RD&D rule

In a separate development, the California Public Utilities Commission proposed a change to remove review and funding of RD&D programs of Pacific Gas & Electric, Southern California Edison, San Diego Gas and Electric and Southern California Gas companies from the utilities' general rate cases. RD&D funding should be reviewed in a separate proceeding, California's PUC suggested.

The PUC proposed the change because RD&D is a unique area of utility operation, which should be given special review outside the context of a general rate case.

The PUC noted that utilities don't always spend authorized RD&D money, may record it in varied ways or combine research projects. Guidelines should be made for planning and reporting RD&D projects, the PUC added.

A predetermined level of funding, annually adjusted for inflation, could sustain and maintain research progress and protect ratepayers, the PUC maintained.

1986 Top 20 Utilities RD&D Funding

Rank	Utility	RD&D in $1000s
1	Southern California Edison*	51,010
2	Pacific Gas & Electric*	31,169
3	Niagara Mohawk Power*	29,759
4	Consolidated Edison of NY*	29,188
5	San Diego Gas & Electric*	23,851
6	Duke Power*	23,259
7	Commonwealth Edison	20,571
8	Georgia Power*	19,265
9	Texas Utilities Electric Co.	17,785
10	Public Service E & G*	16,772
11	Houston Lighting & Power	14,482
12	Florida Power & Light	13,608
13	Philadelphia Electric*	13,324
14	New York State E & G*	10,918
15	Alabama Power	9,748
16	Ohio Power*	9,739
17	Carolina Power & Light	8,975
18	Pennsylvania Power & Light	8,168
19	Union Electric	7,311
20	Connecticut Light & Power	6,841

Rank	Utility	RD & D Funding As A % of Revenue
1	Central Hudson G & E	1.80%
2	San Diego Gas & Electric*	1.79%
3	Niagara Mohawk Power*	1.41%
4	New York State E & G*	0.99%
5	Southern California Edison*	0.96%
6	Iowa Public Service Co.	0.85%
7	Orange & Rockland Utilities	0.83%
8	Rochester Gas & Electric	0.81%
9	Ohio Power	0.73%
10	Consolidated Edison of NY*	0.69%
11	Duke Power*	0.68%
12	Pennsylvania Electric	0.59%
13	Wisconsin Electric Power	0.58%
14	Pacific Gas & Electric*	0.56%
15	Georgia Power	0.56%
16	Madison Gas & Electric	0.55%
17	Public Service Electric & Gas	0.53%
18	Puget Sound Power & Light	0.53%
19	Mississippi Power	0.51%
20	Philadelphia Electric	0.50%

*Utilities on both charts. Source: The TECC Guide to U.S. Electric Utility RD & D Funding 1986-1987.

Yankees vote 'yes,' again for Maine's nuclear plant

WISCASSET, ME—Voters said "yes" to the Maine Yankee nuclear power plant, by a 59- to 41-percent margin. For the third time in seven years anti-nuclear forces failed to close the plant.

Previous votes failed 60 percent to 40 percent in Sept. 1980 and 55 percent to 45 percent in November 1982, as reported in November's *EL&P*.

"I figured it was going to be closer than it was," said Alva Morrison, spokesman for Maine Nuclear Referendum Committee, the group against the plant. The campaign claimed that closing the plant would decrease the chances of a nuclear waste dump being located in the state.

Morrison said, in defeat, that the pro-nuclear forces ran an extremely well-organized and well-funded campaign.

Morrison pointed out that his group raised and spent about $550,000, while pro-nuclear forces reported spending more than $5 million.

"We could have spent about half that amount if we had a straightforward question," said Bob Deis of Vote Yes on One: People for Maine Yankee's Electricity committee.

Deis said the referendum question was confusing because, in the two previous referenda, a "no" vote would have kept the plant operating.

As a result of the confusion, Deis explained, the legislature passed a law requiring that referenda be worded in the traditional manner.

Deis said that although his group did outspend the opposition, Maine people have voted down other highly paid campaigns.

Through an extensive telephone campaign, the pro-nuclear forces were thought to have gotten a larger percentage of their supporters to the polls than the opposition.

Maine Yankee won because of widespread, grass-roots support, Deis claimed. His group emphasized that replacement power would cost much more than electricity from Maine Yankee, that fossil-fueled electricity would negatively affect the environment and that jobs would be lost if the plant closed. Maine Yankee power was named the nuclear industry's cheapest in 1986 by Utility Data Institute Inc.

Deis suggested the Maine vote may not translate into a rubber stamp for other nuclear plant referenda next year in Massachusetts and California.

However achievements like Maine Yankee's achievements could be a plus in other referenda. "If we have safe, reliable, economic nuclear power, the public will support it. Maine Yankee is a national leader. The nuclear industry should keep that in mind," he said.

Maine Yankee won a referendum that would have closed the 15-year old plant after July 4, 1988.

NRC 'okays' restart of Oyster Creek

PARSIPPANY, NJ—The Nuclear Regulatory Commission recently said General Public Utilities could restart the Oyster Creek nuclear plant. The plant was down since a mid-September safety violation during a shutdown.

GPU Nuclear Inc. said it planned operation by the time this edition of *EL&P* is published, following additional maintenance work.

The plant's troubles began on September 11, during a scheduled shutdown. A worker was sprayed with slightly contaminated water. (He washed and was not injured.) In an effort to stop the leak, the wrong valve was closed briefly, which reduced to one the number of generator cooling lines available. This control error resulted in the violation, a GPU spokesman said.

Because the reactor was shut down at the time, the NRC later assessed the risk as small.

The NRC required that plant operators on duty during the incident be assigned to other areas. GPU discovered that some data on the incident was apparently destroyed. An investigative team is looking into the matter, the spokesman said.

Editorial

Big changes still lie ahead as we look toward the New Year

Back in the late '60s and early '70s, Bob Dylan told the world "The times, they are a-changing." That song, which was very big with my two young daughters then, described what was happening in our society. It might be sung now about the conservative, unchanging electric utility industry we know so well.

In recent months, we've heard and read about all those changes that are due to come in the near future...perhaps even next year. But as the New York pitchman says, "Friends, you ain't seen nothin' yet!" Here are some of the developments underway or on the horizon.

Formation of one-utility holding companies is a well-developed trend. Most investor-owned electric companies have decided that a holding company offers real growth potential during this period of low growth in electrical demand and strict oversight by regulatory commissions. Perhaps they've been watching the banking industry, which moved this way a decade ago.

Diversification, that seventy-five cent word that means get into some businesses the state commission can't control, is so widespread that it's the rare electric utility that isn't involved. But many of the diversifications are small and contribute little to the parent. Still incurring learning-curve problems, many diversification efforts remain in the red. But potential profits are there and the range of unregulated businesses utilities are pursuing continues to increase.

Restructuring, with Gencos, transcos and discos, is getting more serious discussion. Several companies have "sold" generating facilities to their own non-regulated subsidiaries and have reduced costs but these remain unusual situations. There's still no real action trend in this direction.

Reduced reliance on central station power. Electric utilities historically have been the primary supplier of bulk power for their customers. But independent producers, cogenerators and Canadian provincial power organizations now offer the prospect of increasing the bulk power supply without capital investment. Since much of this new added capacity will be non-regulated and directly competitive, utilities may be able to develop especially favorable contracts based on low-price offerings. But reliability and long-term availability remain unknowns. Neighboring utilities with current surpluses of capacity may offer a temporary solution, but probably only in the short-term..

Marketing once was the biggest challenge before utilities. Most utilities could "make it easier than they could sell it." So they developed marketing programs and worked them hard. Solid, steady growth followed. Then came the Energy Crisis of 1975-1981 and extensive subsequent conservation efforts that put marketing at the bottom of the list of utility priorities. Growth slowed and financial problems abounded. Now, marketing is back, with a broader goal than before. The goal is not just higher kWh sales, but rather increasing kWh sales where electricity can perform its function better than other energy forms, and reducing them where other energy forms are more competitive.

Market-based rates and cost-based rates may become more common. Market-based rates refer to rates that are set to be competitive with energy costs from other suppliers or from cogeneration arrangements. Cost-based rates are those established for types of customers, based on the real costs of service to those groups. In both cases, the result can be reduced revenues for the electric utility involved, higher rates for some customer groups, or a combination.

Changing patterns of regulation are a growing source of concern to many utility managements. As more and more independent producers, cogenerators and other non-regulated sources of bulk electricity are incorporated into utilities's plans, there is a corresponding increase in regulation focused on the distribution or retail-end of utilities' operations.

How these various developments will affect any individual utility depend on a variety of factors, including location, type of organization and its productivity, financial strength, nature of load, and the regulatory environment, among others. The one thing that seems certain is that many of the electric utility organizations we know today will be substantially different in a year or two.

The degree to which any given utility will be affected, and the direction of change, will depend largely on the skills of its management in anticipating the kinds of pressures and changing environments that may develop, and on its abilities to implement plans to the greatest advantage of the utility.

As we move into 1988, the challenges have never been greater. The corollary to that is that the opportunities never have been brighter, either.

Robert A. Lincicome, Editor-in-Chief

Letters

PCB testing controversy

In December 1986 *EL&P* published an account showing a comparison between gas chromatograph/electric capture detector and gas chromatograph/mass spectrograph for analyzing PCB. This was followed by a series of letters in the March and April issues.

The work in the following report was done to resolve the issue. We believe it has done that. We would appreciate publication.

Gil Addis
Project Manager
Electric Power Research Institute
Palo Alto, CA

Chromatographic Analysis of PCBs in Transformer Oils

A Mini-Round Robin

G. Addis, EPRI & T. Rouse, GE

An article appeared in *Electric Light & Power* magazine in December 1986, reporting that capillary Column Chromatography/Mass Spectroscopy (CC/MS) for analysis of PCBs in transformer oils was more accurate than Packed Column Gas Chromatography/Electron Capture Detector (PC/ECD) and Capillary Column/Electron Capture Detector (CC/ECD). It was said that these commonly relied upon ECD techniques had a tendency to give false high readings. It is shown in this paper that, when properly done, all three techniques give comparable results.

The work was initiated because a number of people and organizations expressed concern over the published claim of systematically incorrect PCB analyses. Included among these were electric utility managers, the United States Environmental Protection Agency, members of ASTM committee D27, who contributed to the development of ASTM Standard Method D4059 (Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography), and Doble Engineering Company. It was suggested that EPRI investigate the matter. EPRI then contracted with General Electric in Pittsfield, MA, to investigate the relationship between the three methods.

General Electric arranged with three nationally known laboratories to run a series of tests. The participants were:

Midwest Research Institute—Rob Scuderi

Radiaan Corporation—Maureen Kilpatrick and Alan Nichols

Twin City Testing—Fred DeRoos

Four samples were obtained and aliquots sent to each laboratory. Each laboratory was requested to analyze the samples by three methods:

PC/ECD—Packed Column/Electron Capture Detector

CC/ECD—Capillary Column/Electroc Capture Detector

CC/MS—Capillary Column/Mass Spectrometer

The samples were as follows:

A— 430 µg/g Aroclor 1254* in aged oil

B—1110 µg/g Aroclor 1242* in new oil

C—2350 µg/g Aroclor 1254* in aged oil

D—4170 µg/g Aroclor 1242* in aged oil

* = Average of all results from three labs and three methods

For comparison of laboratories and methods, the results were normalized so that 1.00 represented the average (for all laboratories and all methods) on each sample. The average values and standard deviation are shown below:

Normalized Results-PCB Analysis
Averaged By Method

Method	*All Samples*	*Value*
PC/ECD	Average	0.97
	Std. Dev.	0.09
CC/ECD	Average	1.08
	Std. Dev.	0.07
CC/MS	Average	1.00
	Std. Dev.	0.19
All Mtds.	Average	1.00
	Std. Dev.	0.13

Normalized Results-PCB Analysis
Averaged By Laboratory

Laboratory	*All Samples*	*Value*
W	Average	0.96
	Std. Dev.	0.14
Y	Average	1.11
	Std. Dev.	0.16
Z	Average	0.93
	Std. Dev.	0.11
All labs	Average	1.00
	Std. Dev.	0.13

Finally, the following observations were made:

○ Results from Lab Y are somewhat higher than the other two.

○ Results from Method CC/ECD are somewhat higher than the other two.

○ Results from Method CC/MS are somewhat more variable.

○ Differences between methods and labs are less than 20 percent.

We concluded that the ECD techniques show no significant systematic difference from MS when proper procedures are used for each, and therefore, the ECD methods do not result in falsely high values.

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